Kidney disease and children – optimising care when prevention fails

The theme for World Kidney Day in 2016 was "kidney disease and children: act early to prevent it". Given the adverse impact of renal replacement therapy (RRT) – encompassing dialysis and transplantation – on quality of life and health care resources, there can be few who would disagree with this ambition. For some children, however, end-stage kidney disease (ESKD) cannot be avoided and its impact has to be managed and outcomes optimised. With increasing fiscal pressures on health services, the accompanying paper by Chesnaye and colleagues looking at macroeconomics and survival on RRT in Europe is very timely [1].

In children, as in adults, spending more on healthcare is associated with higher treatment rates [2, 3], presumably because any benefits from resource spent on preventing ESKD are outweighed by a combination of reductions in competing events and improved availability of RRT. When it comes to survival on RRT, however, different patterns are seen in children and adults: higher expenditure on healthcare is associated with better survival on RRT for children [1] but poorer survival on RRT for adults [4]. While accepting the limitations of such high-level analyses, these findings do seem to suggest differences in the marginal gains from accepting individuals at the opposite extremes of age onto RRT programmes.

Taking a macroeconomic focus in the models creates difficulties when benchmarking performance between countries, however. Some low-income countries may be falsely reassured when their mortality rate looks better after adjustment for how little they spend. High-income countries may be falsely reassured by their performance against the European average because that European average includes some Eastern European countries with very low performance. Furthermore, the comparison should ideally be between age-adjusted rates – France has an older age distribution (i.e. at lower risk) than the average (as demonstrated by the increase in hazard with adjustment for age in Figure 2 in [1]) and a lower RRT incidence rate compared with the UK (6.3 vs 9.8 per million of the population) [2]. We should also really be looking at outcomes for those with ESKD, rather than RRT which ignores outcomes in those who aren't accepted onto treatment. Finally, at least in countries with good survival rates, we need to become more patient-centred and take account of quality of life with validated tools [5] as well as psychosocial outcomes (Figure 1).

The implications for clinical practice also need careful consideration. One possible modifiable explanation for these differences is variation in access to kidney transplantation. Although kidney transplant rates have been included in the model, because of queue theory [6] these will not necessarily reflect the known marked differences in the time children wait for a transplant. Waiting times are known to differ markedly between countries and have been shown to be determined by non-medical factors [7, 8]. For example, a child will wait 6 months for a transplant in France compared with 15 months in the UK, 26 months in the Netherlands and 30 months in Russia [7]. This is relevant because kidney transplantation confers a survival advantage over remaining on dialysis: once children have survived the first few months of kidney transplantation their mortality risk is at least half of what it would have been had they stayed on dialysis [9].

Transplantation is clearly not the only explanation and many other factors need to be systematically explored. One framework for such an approach promulgated by the Cochrane Equity Methods

Group is PROGRESS plus, which lists factors of social disadvantage that may impact upon an individual's access to healthcare, such as place of residence, religion, occupation, gender, race, education, social capital, socio-economic position, social status, plus age and disability. [10] An equity-focused systematic review in adults on dialysis found socially determined factors including low education levels and geographic remoteness were associated with 54% higher risk of cardiovascular events and 21% higher mortality [11].

Overall we feel it is reassuring that a greater proportion of gross domestic product (GDP) spent on healthcare is associated with survival gains for children. This represents a good return on investment of public monies. It would be interesting to know where the "sweet spot" is – that is, at what percentage of GDP spent on healthcare do the gains in child survival level off? Or is the relationship linear?

Fergus J Caskey

UK Renal Registry, Learning and Research, Southmead Hospital, Bristol, UK. BS10 5NB

School of Social and Community Medicine, University of Bristol.

Email: mdfjc@bris.ac.uk

Rachael L Morton

NHMRC Clinical Trials Centre, University of Sydney, Camperdown NSW 1450, Australia.

Email: rachael.morton@sydney.edu.au

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Figure 1. Survival of children aged less than 16 started on renal replacement therapy in the UK between 2000 and 2013, stratified by age at start of treatment: the importance on improving patient-centred outcomes (adapted with permission from [12]).

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